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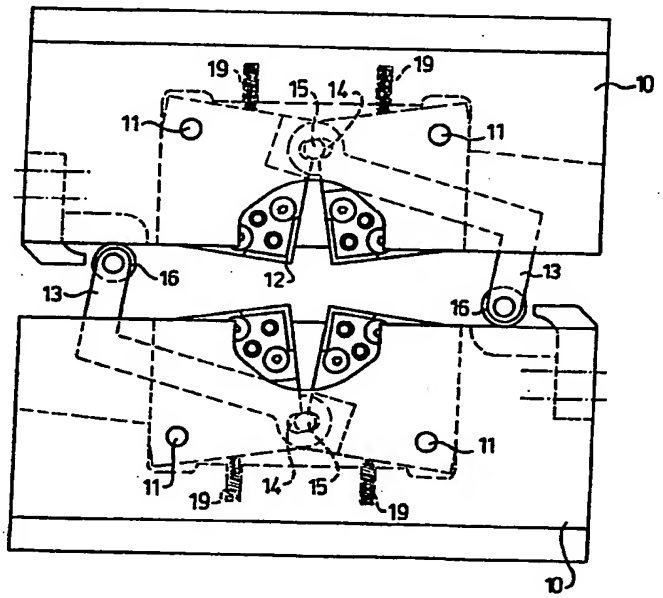

(57) Abstract

Mould device, and process for blow-moulding a container. In order to achieve welds in the centre part of the container, the mould device comprises bottom mould halves (10), two hinged welding jaws (12) always being provided in each mould half. These welding jaws are operated by arms (13) engaging on the opposite mould half, so that during closure of the mould halves the welding jaws carry out the desired movement.

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Mould device, process for the production of a container and container produced by this process.

The present invention relates to a mould device according to the preamble of Claim 1.

Such a mould device is known from US Patent Specification 3,478,388. In this case the welding jaws are fitted in a guide so that they are slidable relative to each other. During closure of the mould halves the welding jaws only carry out a closing movement towards each other in the direction perpendicular to the closing movement of the mould halves. A seam is thereby formed between the welding jaws. With such a device it is not possible to displace material, and a considerable thickening occurs in the intersection point of the seam. In addition, an uneven thickness distribution over the bottom occurs, thereby producing tension concentrations which can lead to premature cracking of the container formed.

The object of the present application is to provide with simple means a construction with which it is possible to make the weld in a more uniform manner.

This object is achieved in the case of a device of the type described above with the characterising features of Claim 1.

It is pointed out that European Patent Application 0,355,437 discloses the use of tilting jaws which during the closing movement of the moulds carry out a movement with a component in the direction of the closure of the mould halves and a component at right angles thereto. These welding jaws are, however, not provided with control devices and are controlled through the contact between opposite welding jaws, which is particularly undesirable and, in particular if for some reason no parison is present will lead to damage to the jaws.

The present invention provides a particularly simple design of the control devices, which is also found to be very effective. A complex guide system, as in the

US Patent Specification 3,478,388, is not necessary, while it is still always ensured that the welding edges of the jaws do not touch each other, but are moved in a controlled manner.

According to an advantageous embodiment of the invention, spring devices are fitted between the welding jaws and the carrier plates, which devices drive the jaws into a position outside the boundary of the carrier plates. When the carrier plates are moved towards each other during closure of the jaws the desired closing action is automatically obtained. This movement can be further synchronised by coupling together at least two jaws.

Although the embodiment described above is extremely satisfactory, it is found that in the event of the feed device for the parison is not functioning, so that no parison is present in the mould halves and they are still closed automatically, there is a possibility that damage will be caused to the welding jaws through the relatively great forces during closure. This problem is avoided according to a preferred embodiment of the invention in that at least one of the welding jaws connected to a carrier plate is coupled to a control rod, one end of which engages on the other carrier plate. The closure of the welding jaws is now no longer achieved by pressing opposite welding jaws towards each other against the spring force during closure of the mould halves, but by the imposed movement of the control rod. This means that opposite welding jaws can never again come into contact with each other, even if no parison is present due to faulty functioning of the feed device for the mould device.

According to a further advantageous embodiment, each carrier plate comprises two welding jaws accommodated in the carrier plate concerned. The four welding jaws in the closed position bound a cross between them, so that a container with two intersecting welds at right angles to each other is obtained. It has been found that such a particularly simple design has the advantage of

container bottoms with more than one weld, i.e. is less susceptible to cracking, and such a device is still relatively cheap to produce.

An optimum weld of the parison is achieved if the boundary edges between the welding jaws are bevelled. A V-shaped rib is thereby produced. This contrasts with the prior art, in which a slightly convex rib containing more material, and therefore more susceptible to cracking, is produced.

According to an advantageous embodiment of the invention, the jaws comprise a convex surface directed towards the inside of the container. This makes it possible to produce a bottom of the container which is curved inwards more towards the centre of the container. As is known, such a bottom has greater strength, and provides placing means in a simple manner, so that the container is suitable without further measures for placing on a table or the like.

According to a further embodiment of the invention, means are present for moving the bottom mould and the top mould relative to each other. This is particularly important if the jaws have a convex surface directed towards the inside of the container, in order to facilitate the discharge of the container after blow-moulding thereof.

The invention also relates to a process for blow-moulding a container, comprising insertion of a parison into an opened mould device, closure of the mould device during blowing, opening of the mould device, and removal of the container. In order to facilitate the discharge of the container, in the case of the mould device described above with a top and bottom mould the top and bottom moulds are moved apart after blowing of the container, and the top and bottom moulds are moved towards each other after removal of the container. Such a process will be carried out in particular if the parison comprises an extruded product.

The invention also relates to a container made by blow-moulding a parison, comprising a bottom part pro-

vided with welds of parts of the parison pressed against each other, which welds are produced on the outside of the bottom. The object of this is to provide less material at the site of the welds, in order in this way to obtain fewer major changes in material thickness, as a result of which the susceptibility to cracking of the container obtained is reduced.

This object is achieved with a container of the type described above through the fact that the welds are V-shaped.

The bottom of the container in this case preferably curves inwards towards the centre.

The invention will be explained below with reference to an example of an embodiment of the mould device and the container thus obtained shown in the drawing, in which:

Fig. 1 shows the mould device according to the invention, in the open position;

Fig. 2 shows the mould device according to Fig. 1, in the closed position;

Fig. 3 shows in bottom view the bottom mould, in the open position;

Fig. 4 shows in bottom view the bottom mould, in the closed position; and

Fig. 5 shows a perspective bottom view of the container made with the mould device according to the above figures.

In Fig. 1 the mould device according to the invention is shown in its entirety by 1. The top part of the mould device for forming the neck of the container is not shown, as can be seen from the break lines 2. The mould device 1 comprises a frame 3 inside which a top mould comprising mould halves 4a and 4b and a bottom mould comprising mould halves 5a and 5b are fitted. Top mould halves 4a, 4b are disposed so that they slide up and down in a sub-frame 6. Operation is by means of hydraulic cylinders. Bottom mould halves 5a and 5b are fixed to the sub-frame 6. Sub-frame 6 is also provided with hydraulic means 8 for moving the mould halves

towards each other, which hydraulic means 8 engage at the other side on the frame 3. In Fig. 1 the mould device is shown in the open position, in which the top mould and the bottom mould have been moved apart by the hydraulic cylinders 7. In Fig. 2 the mould is shown in the closed position through the outward movement of the hydraulic cylinder 8, while the top mould and the bottom mould are moved towards each other by operating the hydraulic cylinder 7.

In Fig. 3 the bottom mould part is shown in bottom view in the open position. It can be seen that it comprises carrier plates 10 fixed to sub-frame 6. Pins 11, fixed to carrier plates 10, hingedly accommodate hinged jaws 12. Springs 19 drive welding jaws 12 into the position shown in Fig. 3. One of each pair of hinged jaws in a carrier plate is connected to a control rod 13. This control rod is provided with a slit-shaped opening 14 in which a pin 15 of the other control jaws engages, so that movement of the control jaws is coupled. The other end of control arm 13 is provided with a roller 16 acting on the opposite carrier plate, as shown in Fig. 3.

Fig. 4 shows the closed position of the bottom mould halves, with the carrier plates 10 lying opposite each other. It can be seen that moving the front faces of the carrier plates 10 towards each other causes the rollers 16, and thus the control arms 13 to move inwards, thus closing the jaws 12. Of course, the opposite faces of the jaws 12 in Fig. 4 lie against each other.

It can be seen that the closing movement of the jaws 12 is achieved by moving the mould halves or the carrier plates 10 towards each other. This contrasts with the state of the art, where the closing movement is achieved by means of a lever system connected to the frame. Through the design according to the invention it is possible in a simple manner to provide separate top and bottom moulds. As can be seen from Figs. 1 and 2, a V-shaped seam 18 is defined between the top boundary of the convex jaws 12.

The device described above works as follows:

In the position with open mould and top and bottom mould moved towards each other a parison is inserted by some manner known in the state of the art into the mould cavity bounded by the mould halves. This can be a tubular extruded product (parison) coming directly from an extruder. Such a parison extends past the welding jaws 12. The mould halves are then moved towards each other during blowing. In the process the welding jaws will move out of the position shown in Fig. 3 into the position shown in Fig. 4. During this the tubular parison will be pinched shut on the bottom side from four sides. It is important to give the welds thus obtained a material thickness which differs as little as possible from the thickness of the remaining bottom material, so that cracks are avoided. This is obtained through the production of a twofold weld, while the V-shaped recess 18 between the jaws 12 also means that the smallest possible thickening is obtained. After closure of the mould and formation of the container through blow moulding of the parison against the mould walls by generally known means, the top mould halves 4a, 4b are moved in the closed position away from the bottom mould halves 5a, 5b, so that the curved bottom of the container comes to lie above the jaws 12. The mould halves are then opened. Such a mutual movement is, of course, necessary only if an inward curved bottom is being produced. This movement is adapted to the slope of the upright inward curved bottom part of the container in such a way that the part of the bottom mould engaging thereon slides along it downwards. If a flat or outward curve is being produced, the mutual movement between the top mould and the bottom mould and the control mechanisms involved can be omitted. Through the presence of the control arm 13 it is ensured that even if, unexpectedly, no parison is present inside the mould halves, jaws 12 cannot hit each other, which could result in damage. The closing movement is controlled entirely by the control arm 13.

The process described above is suitable in particular for processing extruded materials such as

polycarbonate which rapidly becomes fluid when there is a rise in temperature and becomes difficult to process, If in particular laminates are used, changes in thickness are particularly important.

The container obtained by the process according to the present invention is shown in Fig. 5. It is indicated in its entirety by 20 and has a bottom 21 provided with V-shaped ribs 22. They are provided crosswise.

Anyone skilled in the state of the art will understand that numerous modifications can be made to the above without going beyond the scope of the present invention. For example, it is possible to provide more than four weld ribs and to design the parts between top mould and bottom mould differently.

Claims

1. Mould device (1) for blow-moulding a container, comprising a top mould made up of two halves (4a, b) for making at least the walls of said container, and a bottom mould made up of two halves (5a, 5b) for making the bottom of said container, comprising two carrier plates (10) each connected to a top mould half, while two welding jaws (12) are movably disposed on each carrier plate, and each lower mould half is provided with control devices for moving the welding jaws in the direction at right angles to the direction of movement of the mould half, which control devices engage on the opposite mould half, characterised in that the welding jaws are hingedly disposed in such a way that during closing of the mould halves said welding jaws are moved by the control devices in a direction opposite to the closing movement, and the control devices for each mould half have at least one tilting control arm (13), engaging at one side on at least one welding jaw and engaging at the other side on the opposite mould halves.

2. Mould device according to Claim 1, in which spring means (19) which drive the jaws into a position outside the boundary of the carrier plates are fitted between the welding jaws and the carrier plates.

3. Mould device according to any of the preceding claims, in which at least one of the welding jaws is fixed to the control arm.

4. Mould device according to any of the preceding claims, in which for each mould half a control arm which engages on a welding jaw is present, one welding jaw being coupled to the other welding jaw situated in that mould half.

5. Mould device according to any of the preceding claims, in which the boundary edges between the welding jaws are bevelled.

6. Mould device according to any of the preceding claims, in which the welding jaws have a convex surface directed towards the inside of the container.

7. Mould device according to any of the preceding claims, in which means are present for moving the bottom mould and the top mould relative to each other.

8. Process for blow-moulding a container, comprising insertion of a parison into an opened mould device, closure of the mould device during blowing, opening of the mould device, and removal of the container, characterised in that the mould device comprises a mould device according to any of the preceding claims with a top and bottom mould, and in that the top and bottom moulds are moved apart after blowing of the container and the top and bottom moulds are moved towards each other after removal of the container.

9. Process according to Claim 8, in which the parison is a co-extrusion product.

10. Container made by blow-moulding a parison, comprising a bottom part provided with welds of parts of the parison pressed against each other, which welds are produced on the outside of the bottom, characterised in that the welds (22) are V-shaped.

11. Container according to Claim 11, in which the bottom curves inwards towards the centre of the container.

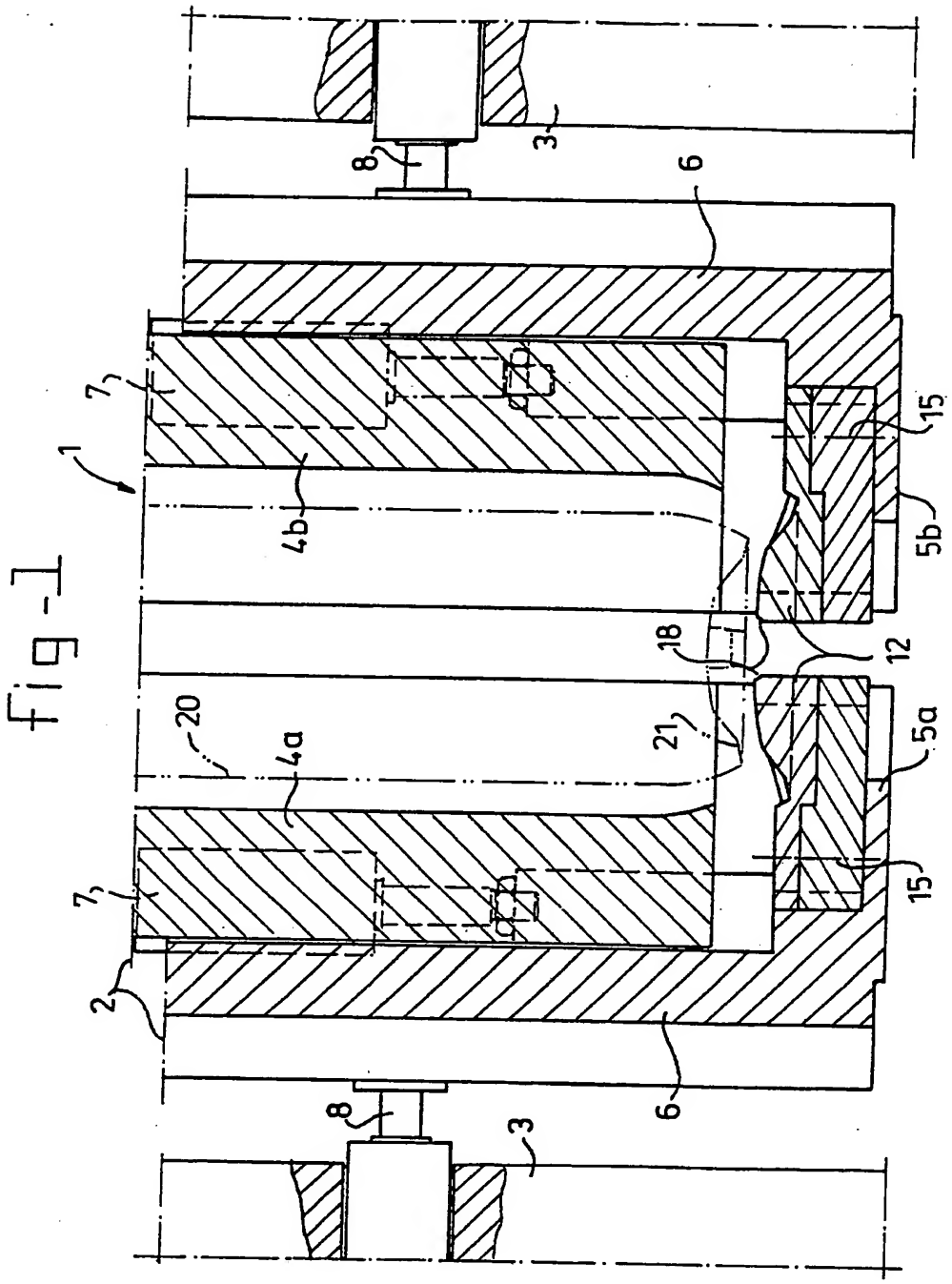


Fig-1

Fig-2

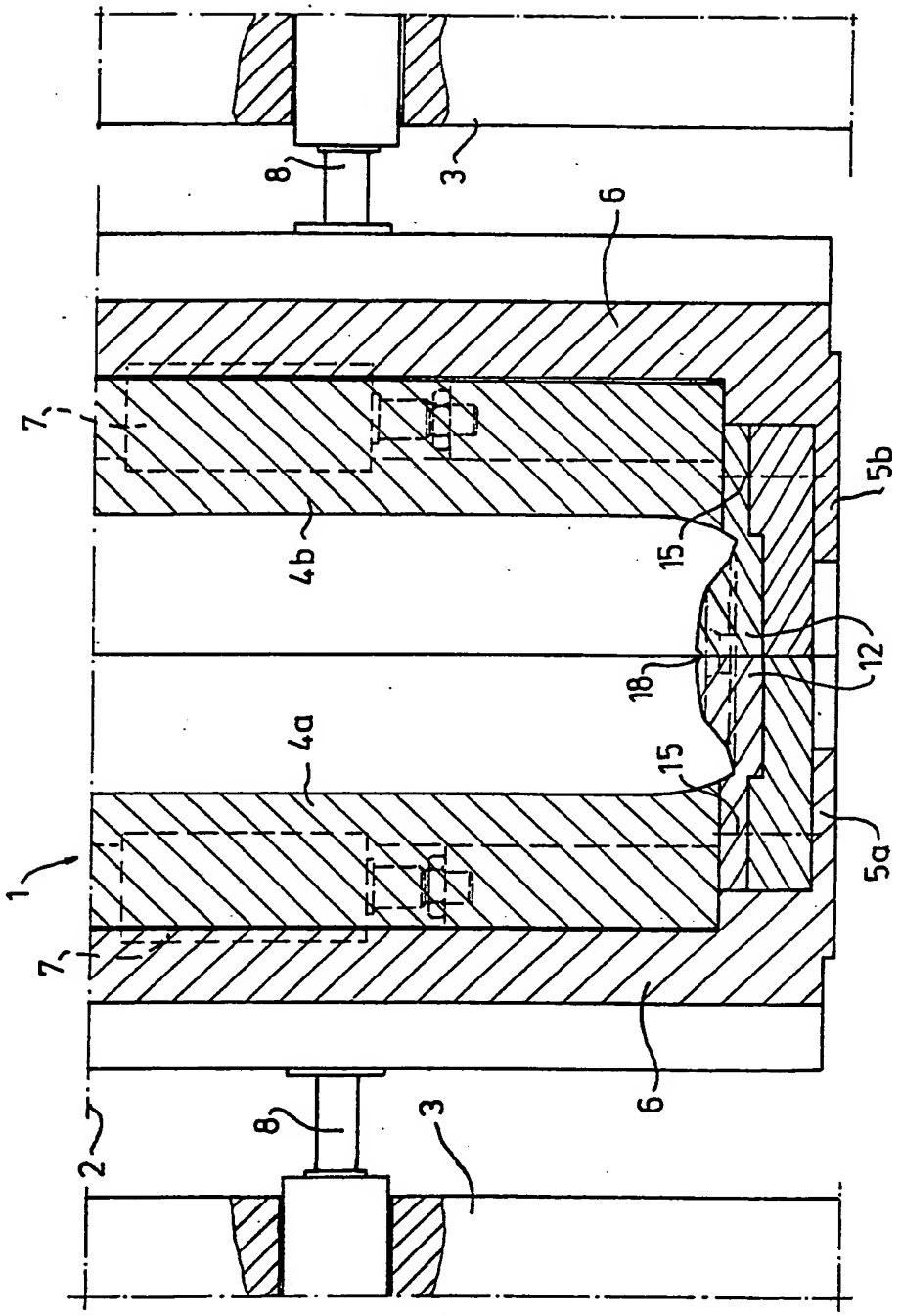


Fig-3

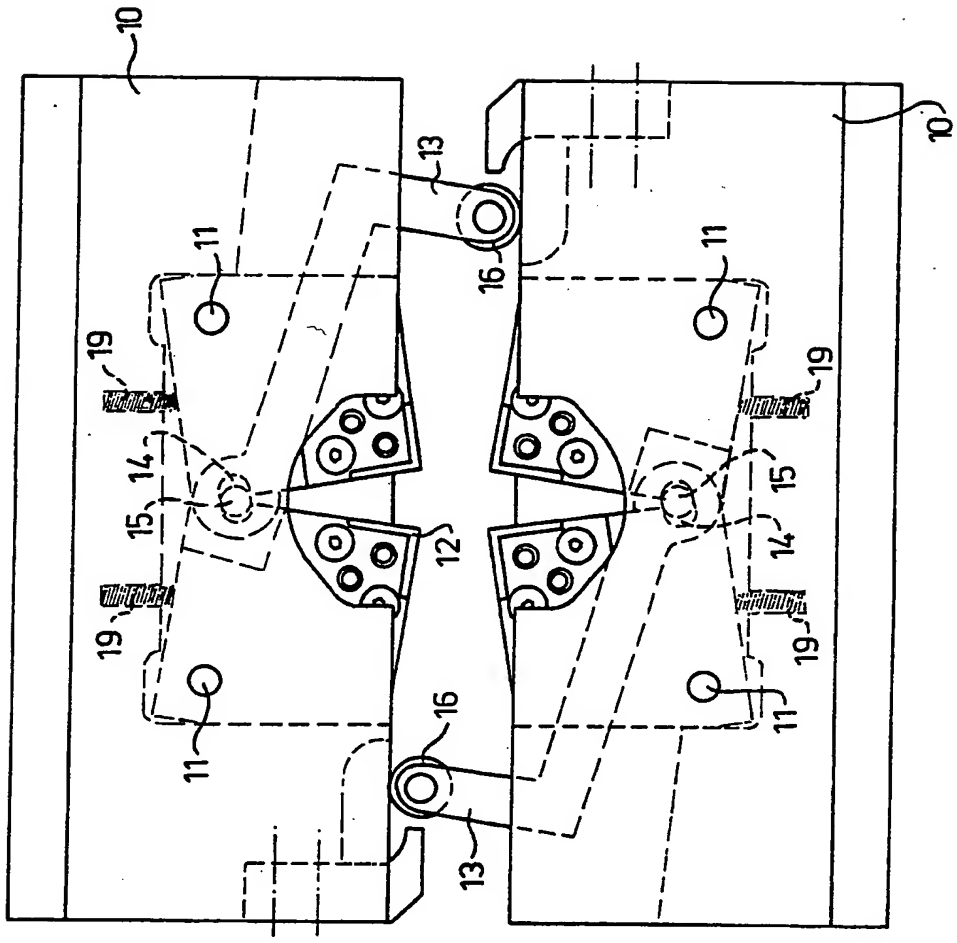


Fig-4

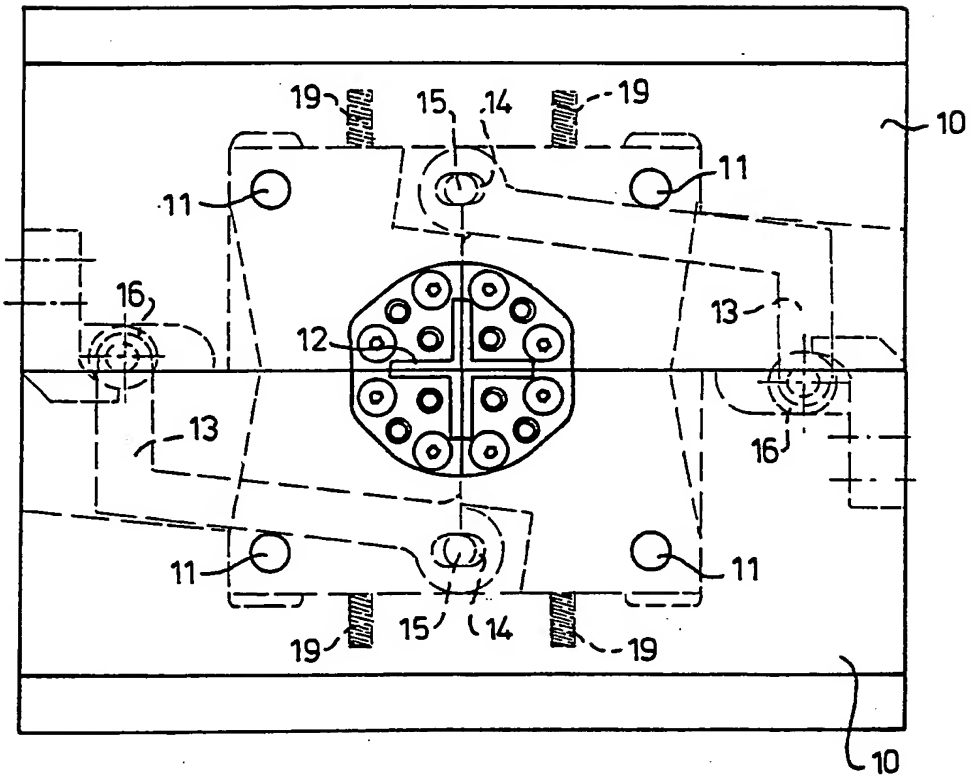
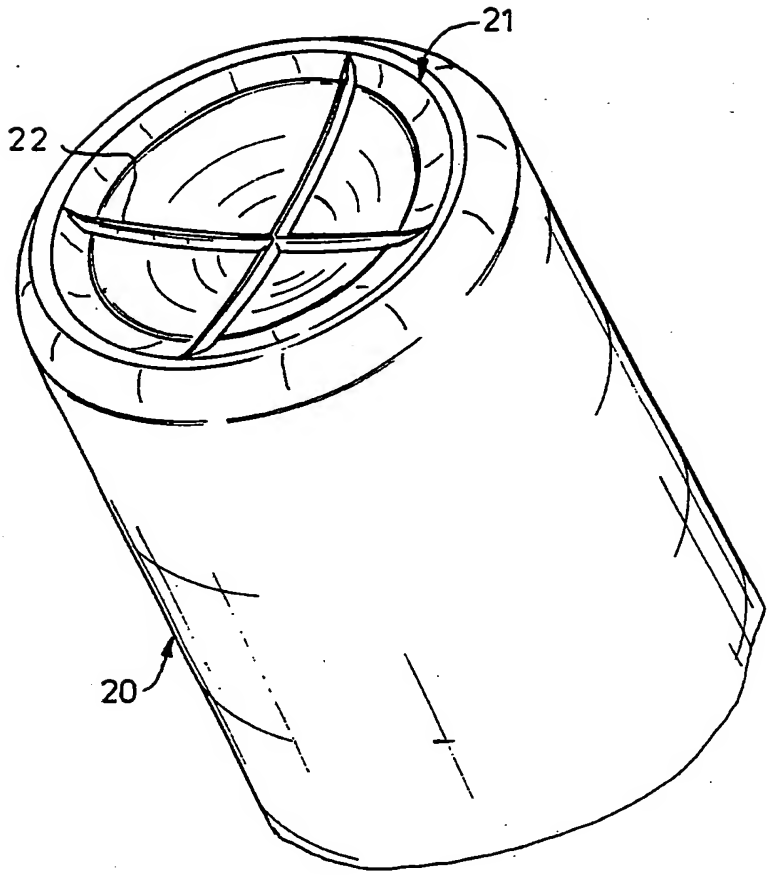


Fig-5



INTERNATIONAL SEARCH REPORT

International Application No PCT/NL 91/00182

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)[6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl. 5 B29C49/48; B29C57/10

II. FIELDS SEARCHED

Minimum Documentation Searched[7]

Classification System	Classification Symbols
Int.Cl. 5	B29C

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched[8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT[9]

Category °	Citation of Document,[11] with indication, where appropriate, of the relevant passages[12]	Relevant to Claim No.[13]
X	US,A,3 753 641 (H.M. TURNER ET AL.) 21 August 1973 see column 4, line 46 - column 6, line 24; figures	8,9
X	US,A,3 478 388 (E.W. TURNER) 18 November 1969 cited in the application	10,11
A	see the whole document	1,8
X	EP,A,0 355 437 (GENERAL ELECTRIC) 28 February 1990 cited in the application	10,11
A	see the whole document	1,8
A	GB,A,1 165 625 (INTERSTABELLA) 1 October 1969 see the whole document	
A	US,A,3 861 845 (A.E. BUTCHER) 21 January 1975 see the whole document	

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° Special categories of cited documents :[10]

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IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
17 JANUARY 1992	11. 02. 92
International Searching Authority	**Signature of Authorized Officer**
EUROPEAN PATENT OFFICE	SZAMOCKI

Form PCT/ISA/210 (second sheet) (January 1985)

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim
A	US,A,3 621 525 (A.E. BUTCHER) 23 November 1971 see the whole document ---	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO. NL 9100182 SA 51994

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 17/01/92
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A-3753641	21-08-73	None		
US-A-3478388	18-11-69	None		
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US-A-3861845	21-01-75	None		
US-A-3621525	23-11-71	None		